

Appl. No. : 09/982,454
Filed : October 17, 2001

AMENDMENTS TO THE CLAIMS

Please amend the Claims as follows. Insertions are shown underlined while deletions are ~~struck through~~.

1 (currently amended): A semiconductor substrate-supporting apparatus for supporting and heating a single semiconductor substrate inside a vacuum-pumped reaction chamber, comprising:

a substrate-supporting surface having a concave portion including a depression slanting toward the center of the substrate--supporting surface, wherein only a peripheral portion of the back surface of the substrate, when loaded, contacts the slanting surface of the concave portion;

a surface peripheral portion formed around the substrate-supporting surface, said surface peripheral portion having a lip portion which protrudes in a ring shape, said lip portion having a top surface and a slanted inner side surface continuing from the top surface and extending to the substrate-supporting surface to prevent a plasma from converging on either the lip portion or the substrate, said top surface being configured to be of substantially the same height as a top surface of the substrate when loaded, said inner slanted side surface being slanted outward at an angle greater than the substrate-supporting surface at a position contacting and facing an outer edge surface of the substrate when loaded;

a heating element embedded below the concave portion;

a radio-frequency electrode of a metal element embedded below the concave portion; and

no mechanical mechanism to clamp the substrate on the substrate-supporting surface.

2 (original): The apparatus as claimed in Claim 1, wherein said slanting surface is a portion of a spherical surface.

3 (original): The apparatus as claimed in Claim 1, wherein said slanting surface is a conical surface.

4 (previously presented): The apparatus as claimed in Claim 1, wherein said concave portion comprises a slanting portion and a flat portion.

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5 (original): The apparatus as claimed in Claim 1, wherein the distance between the back surface of the substrate and the center of the concave surface is 0.05mm to 0.3mm.

6 (cancelled)

7 (previously presented): The apparatus as claimed in Claim 1, wherein the radio-frequency electrode of a metal element is embedded above said heating element.

8 (cancelled)

9 (original): The apparatus as claimed in Claim 1, which is adapted to be installed in a plasma CVD apparatus.

10 (currently amended): A plasma CVD apparatus, comprising:

a vacuum-pumped reaction chamber;

a semiconductor substrate-supporting apparatus for supporting and heating a single semiconductor substrate inside the vacuum-pumped reaction chamber, said substrate-supporting apparatus comprising:

(i) a substrate-supporting surface having a concave portion including a depression slanting toward the center of the substrate-supporting surface, wherein only a peripheral portion of the back surface of the substrate, when loaded, contacts the slanting surface of the concave portion;

(ii) a surface peripheral portion formed around the substrate-supporting surface, said surface peripheral portion having a lip portion which protrudes in a ring shape, said lip portion having a top surface and a slanted inner side surface continuing from the top surface and extending to the substrate-supporting surface to prevent a plasma from converging on either the lip portion or the substrate, said top surface being configured to be of substantially the same height as a top surface of the substrate when loaded, said inner slanted side surface being slanted outward at an angle greater than the substrate-supporting surface at a position contacting and facing an outer edge surface of the substrate when loaded;

(iii) a heating element; and

(iv) no mechanical mechanism to clamp the substrate on the substrate-supporting surface.

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11 (original): The apparatus as claimed in Claim 10, wherein said slanting surface is a portion of a spherical surface.

12 (original): The apparatus as claimed in Claim 10, wherein said slanting surface is a conical surface.

13 (previously presented): The apparatus as claimed in Claim 10, wherein said concave portion comprises a slanting portion and a flat portion.

14 (original): The apparatus as claimed in Claim 10, wherein the distance between the back surface of the substrate and the center of the concave surface is 0.05mm to 0.3mm.

15 (original): The apparatus as claimed in Claim 10, wherein the heating element is embedded below said concave portion.

16 (original): The apparatus as claimed in Claim 15, wherein said substrate-supporting apparatus further comprises a radio-frequency electrode of a metal element embedded below said concave portion and above said heating element.

17-20 (cancelled)

21 (new): A semiconductor substrate-supporting apparatus for supporting and heating a single flat semiconductor substrate inside a vacuum-pumped reaction chamber, comprising:

a substrate-supporting surface comprising a concave portion with a depression slanting toward the center of the substrate-supporting surface, wherein a peripheral portion of the back surface of the flat substrate when loaded, contacts the slanting surface of the concave portion;

a lip portion protruding in a ring shape formed around the substrate-supporting surface, said lip portion being configured to prevent a plasma from converging on either the lip portion or the substrate, said lip portion having a top surface and a slanted inner side surface connecting the top surface and the slanting surface of the substrate-supporting surface, said top surface being configured to be of substantially the same height as a top surface of the substrate when loaded, said inner slanted side surface being continuously slanted outward at an angle greater than the slanting surface of the substrate-supporting surface at a position contacting the substrate when loaded;

a heating element embedded below the concave portion;

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a radio-frequency electrode of a metal element embedded below the concave portion; and

no mechanical mechanism to clamp the substrate on the substrate-supporting surface.